

Land & Water Pacing Guide

Use the information below to assist you in determining the amount of time needed to complete the entire unit. These recommendations assume the **average science class period is 50-60 minutes in length**. We recommend teaching science a minimum of three sessions per week in order to maintain consistency and keep students engaged. Many teachers accomplish this by rotating a science unit with a social studies unit, enabling you to teach more science sessions in one week and finish the unit in fewer weeks. While we highly recommend that all teachers participate in the Expository Writing and Science Notebook Program in order to more fully develop students' science understandings and writing skills, the below recommendations do not include time for implementing the science writing curriculum.

Lessons and Common Assessments (see corresponding lesson in Instructional Guide (IG) for lesson planning)	Recommended Number of Periods	GLEs Addressed/Big Ideas of the Lesson	Special Considerations for Planning	Recommended Applications and Extensions
Lesson 1: Thinking about Land and Water Students share prior knowledge about interactions between land and water.	1-2		Main purpose of lesson is to access prior knowledge of students and to engage them in the topic. Includes preassessment.	Optional Lesson, <i>Life Cycle of Salmon</i> , can be taught any time after lesson 1, if raising salmon eggs.
Lesson 2: The Water Cycle Modeling Land and Water Students build a model and observe water as it changes state from gas to liquid.	3	GLE 1.3.6: Understand how water cycles through the atmosphere. GLE 1.2.4: Understand that Earth's system includes a mostly solid interior, <u>landforms</u> , <u>bodies of water</u> , and an <u>atmosphere</u> . Big Ideas: Water exists in 3 states in the earth system. Evaporation is the process of water changing from a liquid to a gas and condensation is the process of water vapor changing from a gas to a liquid.	Follow lesson modification found in the Instructional Guide in order to address state standards for states of matter and to give students a deeper understanding of the processes of evaporation and condensation.	Extended evaporation & condensation investigations for lesson 2 in the Instructional Guide, IG.
Lesson 3: Modeling Rain on Land Students observe how rain changes the land in their model.	1	GLE 1.3.6: Understand how water cycles through the atmosphere. Big Ideas: Rain is a form of precipitation. Some rain that is absorbed by the land becomes groundwater. Rain that is not absorbed by land runs off of the land, eroding rock and soil.		
Assessment A: Identifying Water in Different States	1	GLE 1.1.5: Understand physical properties of Earth materials including rocks, soil, water, and air. Evidence of learning: <i>Students will describe the states of water on Earth (i.e., clouds, fog, dew, rain, hail, snow, ice) as solid, liquid, or gas.</i>		
Lesson 4: Investigating Streams Students investigate the effect of a slow-moving stream on the land in their models. They collect and record qualitative and quantitative data.	3-4	GLE 1.3.4: Know processes that change the surface of the Earth. GLE 2.1.4: Understand how to use simple models to represent objects, events, systems, and processes. Big Ideas: Flowing water reshapes the land by eroding	<ul style="list-style-type: none"> This is a crucial lesson to teach thoroughly because students will compare their data from this investigation with data collected in lessons 10 & 13. 	

		rock and soil and depositing them in other places.	<ul style="list-style-type: none"> Don't use the data table on pg. 65 of the teacher manual. Use the modified 11"X 14" data table found at the end of the IG instead. Note the yellow pages in the IG, which provide an overview of the entire lesson and suggest ways to divide up the lesson over 3-4 periods. 	
Lesson 5: Examining Earth Materials Students identify properties of the 4 types of soil and observe how each type behaves differently in water.	1	GLE 1.1.5: Understand physical properties of Earth materials including rocks, soil, water, and air. Big Ideas: Different-sized soil particles behave differently in water due to their varying masses.	Lesson 6 is not recommended	
Lesson 7: Where Does the Soil Go? Students observe water flowing at different speeds and compare the effect on erosion and deposition.	2	GLE 1.3.4: Know processes that change the surface of Earth Big Ideas: the more rapidly water flows, the more rock and soil it can remove and transport. As water flow slows, the soil particles being carried drop into the channel or delta. Different-sized soil particles are carried different distances by flowing water due to their varying masses.		Integration with Language Arts: Read pgs. 5-16 in <i>Erosion</i> . (multiple copies in kit)
Assessment B: Explaining the Processes of Erosion and Deposition.	1	GLE 1.3.4: Know processes that change the surface of Earth Evidence of Learning: Describe how weathering and <u>erosion</u> change the surface of the Earth.		
Lesson 8: Bird's-Eye View: Looking at the Parts of a Stream Students identify the common parts of all stream systems.	1-2	GLE 1.2.1: Analyze how the parts of a system go together, and how these parts depend on each other. Big Ideas: Streams have parts and patterns that have been named: head, mouth, delta, canyon, channel. A stream system has inputs and outputs of matter and energy. Flowing water is an example of energy of motion (kinetic).	Lesson 9 is not recommended	3 Optional Lesson Plans can be taught between Lessons 10.5 and 16.5 if you are raising salmon: <i>Run-Off, Watersheds, Modeling Effect of Water-flow on Salmon Eggs in Stream Channel</i>
Lesson 10: Rushing Rivers: Exploring Flow Students investigate the effect of a fast-flowing stream on the land in their models. They collect and record qualitative and quantitative data.	3-4	GLE 2.1.2: Understand how to plan and conduct simple investigations. GLE 2.1.3: Understand how to construct a reasonable explanation using evidence. Big Ideas: Scientists plan and conduct fair tests to find out if changing one variable will affect results. Faster-flowing streams cause more erosion and deposition of soil.	<ul style="list-style-type: none"> Note the yellow pages in the IG, which provide an overview of the entire lesson. Continue to have students use the 11"X14" data table so they can compare results with Lesson 4. 	Language Arts Integration: Read pgs. 32-33, 37 in <i>Erosion</i> . (multiple copies in kit)
Lesson 10.5: Using Student Questions to Plan an Investigation	1-2	GLE 2.1.2: Generate a logical plan for, and conduct, a simple controlled investigation with the following attributes: prediction, variables kept the same (controlled), changed	In Lesson 10.5, an important lesson, the teacher models planning a controlled investigation, using a	

Students generate ideas, turn them into testable questions, then plan and conduct a controlled investigation.		(manipulated) variable, measured (responding) variable, gather, record, and organize data, and multiple trials. Big Ideas: Students generate ideas and turn them into testable questions, which they answer by planning and conducting a controlled investigation, controlling all variables except the changed (manipulated) variable.	student-generated question. This skill is heavily assessed on the science WASL. Lesson 10.5 can optimally replace Lesson 14 if the class investigative question and fair test plan are similar to Lesson 14 in teacher manual. Note lesson plan in the IG.	
Lesson 11: Hills and Rocks Students observe how landforms affect the direction of water flow.	1	GLE 2.1.4: Understand how to use simple models to represent systems and processes. Big Ideas: Landforms, natural and human-made, can serve as obstacles that change the course of flowing water.		<ul style="list-style-type: none"> • Land & Water Field Trip to Thornton Creek or Pipers Creek any time after Lesson 8 has been completed. (Contact Homewaters Project for Thornton Creek trip: 526-0187. Contact Carkeek Park for Pipers Creek trip: 684-0877.) Lesson Plan: <i>Preparing for Field Trip</i> is recommended.
Assessment C: Modeling Processes of the Earth System.	1	GLE 2.1.4: Understand how to use simple models to represent systems and processes. Evidence of Learning: List similarities and differences between a model and what the model represents.	This assessment should be given after students have visited a real stream. Note the field trip opportunities mentioned in Lesson 8.	
Lesson 12: Dams: How Humans Change the Direction and Flow of Water Students construct dams in their models to try to solve a problem.	1	GLE 3.1.1: Understand problems found in ordinary situations in which scientific design can be or has been used to design solutions. GLE 3.1.3: Analyze how well a design solves a problem. Big Ideas: Dams have positive and negative effects on rivers. Salmon populations have been severely depleted due to dams.		Language Arts Integration: Read <i>Salmon</i> for pros and cons of dams and other impacts to salmon habitat. (multiple copies in kit)
Lesson 13: Exploring Slope Students observe the effect of a steep slope on the speed of water flow and resulting erosion and deposition. Pgs. 83-86D	3-4	GLE 2.2.3: Understand why similar investigations may not produce similar results. GLE 1.1.4: Understand that energy comes in many forms. GLE 1.3.1: Understand forces in terms of strength and direction. Big Ideas: The greater the slope of the land, the faster water flows, causing erosion and deposition of soil. Large amounts of soil in streams and rivers can kill salmon eggs by burying them, harm other aquatic organisms and damage habitat.	<ul style="list-style-type: none"> • Note the yellow pages in the IG, which provide an overview of the entire lesson. • Students need to plant seeds in their stream tables and allow about one week for the seeds to grow roots and top growth before running the stream in lesson 14. 	Language Arts Integration: Read pgs. 39-41 in <i>Erosion</i> . (multiple copies in kit)
Lesson 14: Plants: Protecting Sloped Land from Erosion – Students plan a controlled investigation	2	GLE 3.2.4: Understand how humans depend on the natural environment and can cause changes in the environment that affect human’s ability to survive. Big Ideas: The presence of vegetation can inhibit the process		

to observe the effect of plants on a steep slope on erosion and deposition.		of erosion. When humans remove or damage vegetation and leave the land bare, there is more erosion and deposition.		
Assessment D: Explaining the Environmental Impact of Humans on a Stream/River System.		GLE 3.2.4: Understand how humans depend on the natural environment and can cause changes in the environment that affect human's ability to survive.	Short period adequate or can be implemented at end of Lesson 14	
Lesson 16.5: Investigations Planned by Student Groups Students plan and conduct investigations to answer their testable questions.	2-3	GLE 2.1.2: Generate a logical plan for, and conduct, a simple controlled investigation with the following attributes: prediction, variables kept the same (controlled), changed (manipulated) variable, measured (responding) variable, gather, record, and organize data, and multiple trials. Big Ideas: Students generate ideas and turn them into testable questions, which they answer by planning and conducting a controlled investigation, controlling all variables except the changed (manipulated) variable.	Lessons 15-16 not recommended, replace with Lesson 16.5, which provides students another opportunity to plan and conduct a controlled investigation.	
Assessment E: End of Unit Assessment Interpreting Data	1	GLE 2.2.3: Understand why similar investigations may not produce similar results. Evidence of Learning: Describe reasons why two similar investigations can produce different results (e.g., identify possible sources of error).	May be used as post assessment	See teacher manual for other post assessment options.